

TITLE OF THE INVENTION
METHOD AND APPARATUS FOR MANAGING INFORMATION IN
WIRELESS COMMUNICATIONS

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is based upon and claims the
benefit of priority from the prior Japanese Patent
Application No. 2003-053814, filed February 28, 2003,
the entire contents of which are incorporated herein by
reference.

10 BACKGROUND OF THE INVENTION

1. Field of the invention

 The present invention generally relates to a
communication device for receiving information through
wireless communication, and in particular, relates to a
15 technique to manage information.

2. Description of the Related Art

 Recently, portable communication devices such as
mobile phones or personal digital assistants (PDAs) are
in widespread use. In these communication devices,
20 there are provided functions in which the wireless
communication can be used to receive a wide variety of
information from information providing systems using a
wireless communication function, and the information
can be employed using software.

25 Specifically, a portable terminal is proposed in
which there is provided a function to receive
geographical information and use it (e.g., see Jpn.

Pat. Appln. KOKAI Publication No. 2002-236763).

A telecommunications system is also proposed in which desired information only can be obtained efficiently from among provided information (e.g., see
5 Jpn. Pat. Appln. KOKAI Publication No. 2002-24273).

In the portable terminal related to the former prior art, the following function is given, namely, when the portable terminal receives the geographical information and use-permission positional information
10 and determines that the portable terminal does not belong to an effective area identified by the received use-permission positional information, it deletes the received geographical information.

Here, the geographical information delivered to
15 the portable terminal is associated with the use-permission positional information. Therefore, a geographical information transmitting party must attach, without fail, restraint information, namely the use-permission positional information, to the
20 geographical information to be transmitted. In addition, when there are provided a plurality of geographical information transmitting parties, no procedure is considered if the portable terminal receiving the geographical information receives the
25 information of the same type.

Moreover, in the system related to the latter prior art, there is provided a function to delete the

provided information in which the system constantly checks whether established deletion conditions with respect to the received information in a memory are satisfied or not so that only the provided information
5 needed is stored in the memory.

In this system, deletion conditions are generated by an information receiving party and the information is deleted after the deletion conditions are satisfied. Therefore, the deletion conditions that are set by
10 users are assumed. In addition, when there are provided a plurality of information transmitting parties, as well as the former prior art, no procedure is considered if information of the same type is received.

15 In other words, in each method of the prior art, since particular conditions are required upon deletion of the received information, as a result, the possibility increases in which unnecessary information is accumulated within a communication device such as a
20 portable terminal.

BRIEF SUMMARY OF THE INVENTION

In accordance with one embodiment of the invention, there is provided a communication device that has a function to automatically delete information
25 that becomes unnecessary among information received through wireless communication.

The communication device comprises an antenna

module which receives information transmitted through
wireless communication and includes a receiver
sensitivity measuring function; a determining unit
which determines effectiveness of the received
5 information in accordance with the receiver sensitivity
measured by the antenna module; a category determining
unit which determines a category of the received
information; a storage unit which stores the received
information as effective information in accordance with
10 determining results of the determining unit and the
category determining unit; and an information deletion
unit which deletes information of the same category
received prior to the latest received information from
the storage unit.

15 BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The accompanying drawings, which are incorporated
in and constitute a part of the specification,
illustrate embodiments of the invention, and together
with the general description given above and the
20 detailed description of the embodiments given below,
serve to explain the principles of the invention.

FIGS. 1A and 1B are diagrams that describe an
outline of an information providing system in
accordance with an embodiment of the invention.

25 FIG. 2 is a block diagram that shows main parts of
a communication device and an information providing
apparatus in accordance with the embodiment.

FIG. 3 is a flowchart that describes a procedure for information management in accordance with the embodiment.

FIG. 4 is a flowchart that describes a procedure
5 for information processing of the communication device in accordance with the embodiment.

FIG. 5 is a conceptual diagram in accordance with another embodiment.

FIG. 6 is a flowchart that describes a procedure
10 for information processing of the communication device in accordance with another embodiment.

DETAILED DESCRIPTION OF THE INVENTION

Now, with reference to the drawings, embodiments of the invention will be described.

15 FIG. 1 describes an outline of an information providing system in accordance with the embodiment.

A communication device in accordance with the embodiment is a portable terminal 10 that has a wireless communication function. As shown in FIG. 1A
20 and FIG. 1B, the portable terminal 10 has the function in which information delivered, through wireless communication, from a plurality of wireless communication base stations (20A to 20D) that correspond to respective information providing apparatuses, is
25 received and employed.

FIG. 1A shows state in which the portable terminal 10 moves to respective areas covered by respective

wireless communication base stations (20A to 20D) along
with a moving user (dashed line arrow). The portable
terminal 10 utilizes information delivered from the
wireless communication base station (20A to 20D) that
5 is located at a relatively short distance as effective
information. As mentioned below, the portable terminal
10 determines, using a function measuring receiver
sensitivity (i.e., strength of received radio wave)
included in an antenna module, the wireless communi-
10 cation station (20A to 20D) that is located at the
relatively short distance (See FIG. 2).

Here, for example, geographical information is
assumed as the information provided by the respective
information providing apparatuses. This geographical
15 information shall be the information that corresponds
to the communication areas covered by the wireless
communication base station (20A to 20D).

To be more precise, as shown in FIG. 1A, the
portable terminal 10 receives the information
20 (geographical information) from the wireless communi-
cation base station 20A that is located at the
relatively short distance as the effective information
to store it in an internal memory. The portable
terminal 10 executes processing so that the received
25 geographical information is displayed on a display.
Hereby, the user can refer to a map whose effective
area is only the area that is based on the provided

geographical information.

Next, as shown in FIG. 1B, along with the moving user, the portable terminal 10 receives the information (geographical information) from, for example, the wireless communication base station 20C that is located at the relatively short distance as the effective information and stores it in the internal memory. Hereby, the user can refer to the map whose effective area is only the area where the user moved.

Here, for the portable terminal 10, after its movement, information received prior to its movement (here, it means the geographical information from the wireless communication base station 20A) generally becomes unnecessary information. Therefore, in the embodiment, the portable terminal 10 deletes the information that becomes unnecessary (i.e., information received prior to its movement) from the internal memory. Hereby, a use rate and information processing efficiency of the internal memory in the portable terminal 10 can be improved. In addition, the user can constantly employ only the latest and effective geographical information using the portable terminal 10.

(Structure and operation of the portable terminal and the information providing apparatus)

Hereinafter, the concrete structure and operation of the embodiment will be described with reference to

FIG. 2 to FIG. 4.

FIG. 2 is a block diagram that shows the structures of the portable terminal 10 and the information providing apparatus 20, respectively.

5 The information providing apparatus 20 is what is called a server and includes a provided information input unit 200, a category information input unit 201, a provided information storage unit 202, a category information storage unit 203, an associating unit 204,
10 an associated data storage unit 205 and an associated data delivery unit 206. The information providing apparatus 20 is designed by the structure comprising software and a CPU executing the relevant software or by hardware configuration such as the memory and
15 storage (disk drive) or the like.

 The provided information input unit 200 receives the information to be provided (here, it means the geographical information.) and stores it in the provided information storage unit 202. The category
20 information input unit 201 receives the category information that indicates the category of the information to be provided (here, it means the map) and stores it in the category information storage unit 203. Here, the provided information storage unit 202, the
25 category information storage unit 203 and the associated data storage unit 205 mean, for example, a hard disk drive or the like.

The associating unit 204 associates the information (geographical information) that is to be provided and is stored in the provided information storage unit 202 with its category information that is stored in the category information storage unit 203, then stores it in the associated data storage unit 205. The associated data delivery unit 206 delivers associated information (geographical information and its category information) that is stored in the associated data storage unit 205 through the wireless communication base station (20A to 20D).

The portable terminal 10 includes an antenna module 100 for receiving the radio wave transmitted from the wireless communication base station (20A to 20D), an associated data reception unit 101, a distance determining unit 102, a category information determining unit 103, a receivable category information storage unit 104 and a receivable category information input unit 105.

The antenna module 100 includes the receiving function receiving the information, in the form of radio waves, that is delivered from the information providing apparatus 20, while including the measuring function measuring the receiver sensitivity corresponding to the strength of the relevant received radio wave. The distance determining unit 102 determines the distance from the wireless communication base station

(20A to 20D) of the information providing apparatus 20 in accordance with the receiver sensitivity that is measured with the antenna module 100. To be more precise, the distance determining unit 102 generates
5 determining information identifying the wireless communication base station (20A to 20D) that is located at the relatively short distance.

The associated data reception unit 101 has a function determining whether the information
10 (associated information) received with the antenna module 100 is received or not and stores the received information in an associated data storage unit 107.

The associated data reception unit 101 determines reception of the received information (authentic
15 reception) based on a determining result from the distance determining unit 102 and a determining result from the category information determining unit 103.

That is to say, the associated data reception unit 101 receives the information in accordance with the
20 determining result from the category information determining unit 103 when the category information included in the associated information received matches a predetermined category information, while the reception is rejected when mismatch occurs. In
25 addition, the associated data reception unit 101 receives, in case of the information of the same category, the information from the information

providing apparatus 20 that is located at the relatively short distance in accordance with the determining result from the distance determining unit 102.

5 The category information determining unit 103 compares receivable category information that is input by the category information input unit 105 and is stored in the receivable category information storage unit 104 with the category information tentatively
10 received at the associated data reception unit 101. The category information input unit 105 inputs the category information that is previously transmitted from outside through the antenna module 100 or the category information that is input from an input
15 apparatus (not shown) of the portable terminal 10 by the user into the receivable category information storage unit 104.

 Moreover, the portable terminal 10 has an associated data deletion unit 106 and an information
20 presentation unit 108. The information presentation unit 108 executes processing by which the information that is stored in the associated data storage unit 107 is displayed on the display, for example, provided on the portable terminal 10, or the like. Using this
25 information presentation unit 108, the user can refer to the received geographical information on the display.

The associated data deletion unit 106 deletes the information determined to be unnecessary from among the information that is stored in the associated data storage unit 107. To be more precise, when the
5 associated data deletion unit 106 receives, in accordance with the determining result from the distance determining unit 102, the information from the information providing apparatus 20 that is located at the relatively short distance, it deletes all the
10 information (information of the same category) that is previously received and is stored in the associated data storage unit 107. The distance determining unit 102 constantly monitors, in accordance with the receiver sensitivity measured with the antenna module
15 100, the distance from the information providing apparatus 20 (wireless communication base station (20A to 20D)).

In addition, the portable terminal 10 is designed by the structure including the software, the CPU that
20 executes the relevant software and the internal memory (such as flash EEPROM). The associated data storage unit 107 is a component that corresponds to the internal memory.

(Operation of the portable terminal)

25 Next, the operation of the portable terminal 10 in accordance with the embodiment will be described with reference to FIG. 3 and FIG. 4.

First, basic operation in accordance with the embodiment will be described with reference to a flowchart of FIG. 3.

When the portable terminal 10 receives the radio
5 wave with the antenna module 100, the associated data reception unit 101 determines whether the received information is effective or not (receivable or not) (Step S1 and S2). The associated data reception unit 101 determines it, as mentioned above, in
10 accordance with both measured result of the receiver sensitivity at the antenna module 100 and the category information (information indicating that it is the geographical information) included in the associated information received.

15 To be more precise, in accordance with the measured result of the receiver sensitivity, the associated data reception unit 101 regards the information as effective, the information being delivered from the information providing apparatus 20
20 located at the relatively short distance. For more detail, when the portable terminal 10 is located on a position as shown in FIG. 1A, the information that is delivered from the information providing apparatus 20 corresponding to the wireless communication base
25 station 20A. It is needless to say that the associated data reception unit 101 regards the information as ineffective regardless of content of the information

when the receiver sensitivity does not exceed a given level.

Furthermore, when the mismatch occurs between the category information included in the associated data received and the category information (map) previously stored in the receivable category information storage unit 104, the associated data reception unit 101 determines that it is not effective (NO in step S2). In this case, the portable terminal 10 executes other processing until it receives the effective information.

The associated data reception unit 101 determines the received geographical information to be effective and receives it, and then stores the information in the associated data storage unit 107 (YES in Step S2 and Step S4). Hereby, with the information presentation unit 108 of the portable terminal 10, the user can refer to the received geographical information on the display.

In this embodiment, when the associated data reception unit 101 receives the effective geographical information, the associated data deletion unit 106 deletes the geographical information (information of the same category) that is previously received prior to the current point of time of reception (the latest point of time of reception) and stored in the associated data storage unit 107 (Step S3). For example, as shown in FIG. 1B, a case is assumed in

which, along with the moving portable terminal 10, the information is received from the information providing apparatus 20 that corresponds to the wireless communication base station 20C. In the above-mentioned case, the information that is delivered from the information providing apparatus 20 corresponding to the wireless communication base station 20A is deleted from the internal memory 107, the information being received prior thereto.

Concrete operation of the portable terminal 10 in the embodiment is described with reference to a flowchart of FIG. 4.

When the antenna module 100 receive the radio waves, the associated data reception unit 101 executes the determining of suitability whether it is receivable or not (Steps S11 and S12). When the mismatch occurs between the category information included in the associated information received and the category information previously stored in the category information storage unit 104, reception is rejected by the associated data reception unit 101 in accordance with the determining result from the category information determining unit 103 (Steps S13 and S20).

When both pieces of the category information match, the associated data reception unit 101 receives the information as effective in accordance with the determining result (receiver sensitivity) of the

distance determining unit 102, the information being
from the information providing apparatus 20 located at
the relatively short distance (Step S14). As a matter
of course, reception of the information that is from
5 the information providing apparatus 20 located at a
relatively long distance is rejected even if the
category is the same (Step S20).

The associated data reception unit 101 stores the
received information (geographical information) in the
10 associated data storage unit 107 (Step S15). The
information presentation unit 108 executes processing
such as displaying the information stored in the
associated data storage unit 107 on the display, for
example, provided on the portable terminal 10, or the
15 like (Step S16). With this information presentation
unit 108, the user can refer to the received
geographical information on the display.

In the portable terminal 10, when the effective
geographical information is received by the associated
20 data reception unit 101, the associated data deletion
unit 106 is activated (YES in Step S17). The
associated data deletion unit 106 retrieves the
associated data storage unit 107 and deletes the
geographical information that is received prior to the
25 current point of time of reception (the latest point of
time of reception) (Step S18 and S19).

As described above, in accordance with the

embodiment, when the information (geographical
information) of the predetermined category (e.g., map)
is received as effective, the information of the same
category (e.g., geographical information in different
5 area) that is previously received and stored can be
deleted from the internal memory 107.

In consequence, the user's operation is not
necessary and the unnecessary information can be
automatically deleted from the portable terminal 10.
10 Hereby, the portable terminal 10 can omit the
processing for displaying the unnecessary information
for the user. In addition, since the unnecessary
information can be deleted from the internal memory 107
of the portable terminal 10, the use rate of the
15 internal memory 107 can be improved.

Here, the associated data deletion unit 106 of
the embodiment may delete, in accordance with the
determining result (receiver sensitivity) from the
distance determining unit 102, the received information
20 as unnecessary, the received information being the
information received when the distance changes from the
relatively short distance to a long distance. In this
case, an operation may be possible in which at the
stage when communication to the information providing
25 apparatus located at the relatively short distance is
established, the previous information is not deleted
immediately but is temporarily stored and is deleted at

the stage when a certain distance arises.

In addition, the portable terminal 10 may include the structure having a function in which the information received from respective information providing apparatuses is not deleted immediately but stored in the internal memory, and then the plurality of pieces of information are displayed on the display, the pieces of information being weighted according to the distance from the information providing apparatuses.

Furthermore, the portable terminal 10 does not delete information previously received but stores it in the internal memory after attaching a possible deletion index to it. Then, the portable terminal 10 deletes the information only to which the possible deletion index is attached at the time there is a shortage of internal memory capacity.

Moreover, at the stage when the communication to the information providing apparatus located at the relatively short distance is established, the portable terminal 10 does not receive and store the information received from the apparatus, yet retrieves the internal memory. The portable terminal 10 may have structure in which when the portable terminal succeed in retrieving the information from the internal memory, then the information can be used intact. Here, when the possible deletion index is attached to the information, the possible deletion index is deleted.

Although the portable terminal 10 in accordance with the embodiment is assumed to be standard mobile phones and personal digital assistants (PDAs), the embodiment is not limited thereto and dedicated
5 terminals, for example, applicable to portable type navigation can also be assumed.

(Another embodiment)

FIG. 5 and FIG. 6 describe another embodiment.

The embodiment relates to the portable terminal 10
10 that receives positional information transmitted from a wireless communication device 54 (wireless chip), instead of the wireless communication base station, the wireless communication device 54 having a short
distance wireless communication function in a narrow
15 area such as exhibition hall and so on. In addition, the basic structure of the portable terminal 10 is the same as the one that is shown in FIG. 2.

The wireless communication device 54 is a small sized device which includes a wireless communication
20 circuit that transmits identification code information such as a positional code. In the embodiment, as shown in FIG. 5, an exhibition hall 50 in which plural booths are placed is assumed. Respective booths 53 are
exhibition areas to present different products and
25 services, respectively.

The wireless communication device 54 is placed with respect to each booth 53 and constantly transmits

the identification code information (positional code information) to identify a position of each booth 53. Moreover, in the embodiment, an information providing apparatus 52 that delivers guidance information of each booth 53 is placed, for example, in the vicinity of an entrance 51 of the exhibition hall 50. The information providing apparatus 52 is basically the same as the one that is shown in FIG. 2 while aforementioned positional code information with respect to each booth 53 is used as the information corresponding to the category information.

(Operation of another embodiment)

Hereinafter, mainly with reference to a flowchart in FIG. 6, the operation of the embodiment will be described.

First, when the user enters the exhibition hall 50 through the entrance 51, the portable terminal 10 receives the guidance information that is delivered from the information providing apparatus 52 (Step S100). At the time, the portable terminal 10 receives the guidance information that is associated with the positional code information and stores it in the internal memory.

Next, when the portable terminal 10 moves within the exhibition hall 50 along with the user, it receives the positional code information transmitted from the wireless communication device 54 placed with respect to

each booth 53. At the time, as mentioned above, the portable terminal 10 receives the positional code information as effective in accordance with the receiver sensitivity measured with the antenna module, the positional code information being transmitted from the wireless communication device 54 located at the relatively short distance (YES of Step S101).

The portable terminal 10 retrieves the guidance information from the internal memory, the guidance information corresponding to the received positional code information (Step S102). The portable terminal 10 executes the processing displaying the relevant guidance information on the display (Step S103).

Hereby, the user can refer to the guidance information on the display of the portable terminal 10, the guidance information being the information from the nearest located booth 53. Therefore, for example, the user can judge, in accordance with the relevant guidance information, whether the booth is the desired booth or not and when he does not have interest in the booth, he can move to the other booths.

On the other hand, after receiving the guidance information regarding the positional code information when the portable terminal 10 cannot receive the relevant positional code information, the portable terminal 10 deletes the guidance information that is stored in the internal memory (YES in Step S104, and

S105). As mentioned above, based on the receiver sensitivity measured with the antenna module, when reception level does not exceed a given level, the portable terminal 10 determines that the relevant positional code information cannot be received.

Here, when the portable terminal 10 cannot receive the positional code information correctly within a predetermined time interval, the portable terminal 10 makes a transition to the processing to delete the guidance information stored in the internal memory. Even if the guidance information stored in the internal memory is once deleted, the portable terminal 10 can restore the relevant guidance information by moving in the vicinity of the entrance 51 again to receive the guidance information from the information providing apparatus 52.

As mentioned above, it follows that, for example, when the portable terminal 10 in the embodiment cannot receive the positional code information which is effective only within the area in the exhibition hall 50 after receiving and storing the guidance information which is effective only within the area in the exhibition hall 50, it deletes the relevant guidance information.

To be more precise, when the user goes out of the exhibition hall 50, the portable terminal 10 automatically deletes the relevant guidance information because

it cannot receive the positional code information.
Hence, outside the exhibition hall 50, the relevant
information that becomes unnecessary can be deleted
from the portable terminal 10. If the user hopes to
5 restore the deleted guidance information, it can be
realized by receiving the guidance information again at
the exhibition hall 50.

In addition, although the embodiment relates to an
information management method in which the guidance
10 information at the exhibition hall 50 is associated
with the positional code information, the embodiment is
not limited thereto and it can be applied to the
information management method in a narrow area, for
example, a theme park or the like. Moreover, in the
15 embodiment, although the portable terminal has the
structure in which the stored guidance information is
deleted when it cannot receive the positional code
information, the embodiment is not limited thereto.
For example, one structure may be possible in which,
20 when the portable terminal 10 receives the information
that indicates deletion of the guidance information, it
deletes the stored guidance information.

As described above in detail, in accordance with
the embodiment, when the information of the same
25 category is received from a plurality of information
providing parties to utilize, all the information other
than the latest information is deleted. Moreover,

among the information that is received prior to the latest point of time of reception, information that is shifted from effective to ineffective is deleted.

Therefore, as a result, unnecessary information can be
5 automatically deleted from the communication device.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details and representative embodiments
10 shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general invention concept as defined by the appended claims and their equivalents.